Kentucky Tutorials are designed specifically for the Kentucky Academic Standards to prepare students for the K-PREP, EOC exams, ACT, and ACT Plan.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

1. PRECISION, ACCURACY, AND CONSTRUCTIONS

MONITORING PRECISION AND ACCURACY

- **KY.HS.N.5** *Define appropriate units in context for the purpose of descriptive modeling.*
- **KY.HS.N.6** *Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*
- **KY.HS.N.4.a** *Choose and interpret units consistently in formulas;*
- **KY.HS.N.4.b** *Choose and interpret the scale and the origin in graphs and data displays.*
- **KY.HS.G.8.a** *Make formal geometric constructions with a variety of tools and methods.*

CONSTRUCTIONS

- **KY.HS.G.8.a** *Make formal geometric constructions with a variety of tools and methods.*
- **KY.HS.G.8.b** *Apply basic construction procedures to construct more complex figures.*

2. POINTS AND LINES

POINTS, RAYS, LINE SEGMENTS, LINES, AND FIGURES

- **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
- **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

PARALLEL AND PERPENDICULAR LINES

- **KY.HS.G.22** *Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.*
- **KY.HS.G.1.b** *Understand properties of and differences between perpendicular and parallel lines.*

3. LINES AND ANGLES

PARALLEL LINES AND ANGLE RELATIONSHIPS

- **KY.HS.G.1.b** *Understand properties of and differences between perpendicular and parallel lines.*
- **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
- **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*

- **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
- **KY.HS.G.16.a** *Recognize differences between and properties of inscribed, central and circumscribed angles.*

- **PERPENDICULAR BISECTOR AND ANGLE BISECTOR THEOREMS**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.16.a** *Recognize differences between and properties of inscribed, central and circumscribed angles.*
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*

4. COORDINATE GEOMETRY

- **LENGTH AND THE DISTANCE FORMULA**
  - **KY.HS.G.23.a** *Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment.*
  - **KY.HS.G.23.b** *Find the point on a directed line segment between two given points that partitions the segment in a given ratio.*
  - **KY.HS.G.24.a** *Compute the perimeters of various polygons.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - **KY.HS.G.24.b** *Compute the areas of triangles, rectangles and other quadrilaterals.*

- **MIDPOINT FORMULA ON THE COORDINATE PLANE**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.23.a** *Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment.*
  - **KY.HS.G.23.b** *Find the point on a directed line segment between two given points that partitions the segment in a given ratio.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - **KY.HS.G.24.a** *Compute the perimeters of various polygons.*

- **CONJECTURES IN COORDINATE GEOMETRY**
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
  - **KY.HS.G.21** *Use coordinates to justify and prove simple geometric theorems algebraically.*
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*

5. PERIMETER AND AREA

- **PERIMETER ON THE COORDINATE PLANE**
  - **KY.HS.G.24.a** *Compute the perimeters of various polygons.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - **KY.HS.G.21** *Use coordinates to justify and prove simple geometric theorems algebraically.*

- **AREA ON THE COORDINATE PLANE**
  - **KY.HS.G.24.b** *Compute the areas of triangles, rectangles and other quadrilaterals.*

6. TRANSFORMATIONS

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - **KY.HS.G.4.c** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **KY.HS.G.2.a** *Describe transformations as functions that take points in the plane as inputs and give other points as outputs.*
  - **KY.HS.G.2.b** *Compare transformations that preserve distance and angle measures to those that do not.*

- **KY.HS.G.4.b** *Specify a sequence of transformations that will carry a given figure onto another.*
- **KY.HS.G.9.a** *Verify the properties that result from that dilations given by a center and a scale factor.*
- **KY.HS.G.9.b** *Verify that a dilation produces an image that is similar to the pre-image.*

- **DILATIONS, TRANSLATIONS, ROTATIONS, AND REFLECTIONS**
  - **KY.HS.G.4.c** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **KY.HS.G.4.b** *Specify a sequence of transformations that will carry a given figure onto another.*
  - **KY.HS.G.9.a** *Verify the properties that result from that dilations given by a center and a scale factor.*
  - **KY.HS.G.4.a** *Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure.*
  - **KY.HS.G.9.b** *Verify that a dilation produces an image that is similar to the pre-image.*
  - **KY.HS.G.2.b** *Compare transformations that preserve distance and angle measures to those that do not.*

7. CONGRUENCE AND SIMILARITY

- **TRIANGLES AND CONGRUENCE TRANSFORMATIONS**
  - **KY.HS.G.4.c** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
  - **KY.HS.G.5.a** *Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.*
  - **KY.HS.G.5.b** *Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.*

- **CONGRUENCE OF OTHER POLYGONS**
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - **KY.HS.G.4.c** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **KY.HS.G.4.b** *Specify a sequence of transformations that will carry a given figure onto another.*
  - **KY.HS.G.2.a** *Describe transformations as functions that take points in the plane as inputs and give other points as outputs.*
  - **KY.HS.G.2.b** *Compare transformations that preserve distance and angle measures to those that do not.*
  - **KY.HS.G.4.a** *Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure.*
  - **KY.HS.G.2.c** *Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.*

- **TRIANGLES AND SIMILARITY TRANSFORMATIONS**
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
  - **KY.HS.G.11.a** *Apply theorems about triangles.*
  - **KY.HS.G.11.b** *Prove theorems about triangles.*
  - **KY.HS.G.10** *Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.*
  - **KY.HS.G.11.c** *Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*

8. TRIANGLES

- **TRIANGLE ANGLE THEOREMS**
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
  - **KY.HS.G.11.a** *Apply theorems about triangles.*

- **TRIANGLE BISECTORS**

- **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
- **KY.HS.G.16.a** *Recognize differences between and properties of inscribed, central and circumscribed angles.*
- **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
- **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
- **KY.HS.G.11.a** *Apply theorems about triangles.*
- **KY.HS.G.8.a** *Make formal geometric constructions with a variety of tools and methods.*
- **KY.HS.G.17.a** *Construct the inscribed and circumscribed circles of a triangle.*

9. QUADRILATERALS

- **PARALLELOGRAMS AND RECTANGLES**
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
  - **KY.HS.G.7.b** *Construct formal proofs to justify theorems for parallelograms.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

- **SQUARES AND RHOMBI**
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
  - **KY.HS.G.7.b** *Construct formal proofs to justify theorems for parallelograms.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

10. RIGHT TRIANGLES AND TRIGONOMETRIC RATIOS

- **PYTHAGOREAN THEOREM**
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
  - **KY.HS.G.12.c** *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - **KY.HS.G.12.a** *Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent).*
  - **KY.HS.G.11.a** *Apply theorems about triangles.*
  - **KY.HS.G.11.b** *Prove theorems about triangles.*
  - **KY.HS.G.11.c** *Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*

- **TRIGONOMETRIC RATIOS**
  - **KY.HS.F.16.b** *Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$ and use the unit circle to express the values of sine, cosine and tangent for $\pi - x$, $\pi + x$ and $2\pi - x$ in terms of their values for x, where x is any real number.*
  - **KY.HS.G.12.c** *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
  - **KY.HS.G.12.a** *Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent).*
  - **KY.HS.G.12.b** *Explain and use the relationship between the sine and cosine of complementary angles.*
  - **KY.HS.G.11.c** *Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

11. CIRCLES

- **CIRCLE BASICS**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.16.a** *Recognize differences between and properties of inscribed, central and circumscribed angles.*

- **CENTRAL ANGLES, INSCRIBED ANGLES, AND CHORDS**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*

- **KY.HS.G.16.a** *Recognize differences between and properties of inscribed, central and circumscribed angles.*
- **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*
- **KY.HS.G.16.b** *Understand relationships between inscribed angles and the diameter of a circle.*
- **KY.HS.G.18.a** *Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector.*

- **TANGENTS, ANGLES, AND INTERCEPTED ARCS**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.16.c** *Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.*
  - **KY.HS.G.16.a** *Recognize differences between and properties of inscribed, central and circumscribed angles.*
  - **KY.HS.G.7.a** *Construct formal proofs to justify theorems for lines, angles and triangles.*
  - **KY.HS.G.6** *Apply theorems for lines, angles, triangles, parallelograms.*

12. PROPERTIES OF CIRCLES 1

- **CONGRUENT AND SIMILAR CIRCLES**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.15** *Verify using dilations that all circles are similar.*
  - **KY.HS.G.4.c** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **KY.HS.G.9.a** *Verify the properties that result from that dilations given by a center and a scale factor.*
  - **KY.HS.G.9.b** *Verify that a dilation produces an image that is similar to the pre-image.*
  - **KY.HS.G.3** *Develop formal definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.*

- **CIRCUMFERENCE AND ARC LENGTH**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.25.a** *Finding the circumference and area of a circle.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

13. PROPERTIES OF CIRCLES 2

- **AREA OF CIRCLES AND SECTORS**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.25.a** *Finding the circumference and area of a circle.*
  - **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

- **CIRCLES**
  - **KY.HS.G.1.a** *Understand properties of line segments, angles and circle.*
  - **KY.HS.G.25.a** *Finding the circumference and area of a circle.*
  - **KY.HS.G.19.c** *Complete the square to find the center and radius of a circle given by an equation.*
  - **KY.HS.G.19.a** *Write the equation of a circle of given center and radius using the Pythagorean Theorem.*

14. SURFACE AREA

- **SURFACE AREA AND VOLUME OF SPHERES**
  - **KY.HS.G.26** *Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.*
  - **KY.HS.G.25.b** *Finding the volume of a sphere, prism, cylinder, pyramid and cone.*
  - **KY.HS.G.27** *Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms.*
  - **KY.HS.G.28** *Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-*

dimensional objects generated by rotations of two-dimensional objects.

- ○ **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

- **SURFACE AREA OF COMPOSITE SOLIDS**

  - ○ **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - ○ **KY.HS.G.8.b** *Apply basic construction procedures to construct more complex figures.*

- **SURFACE AREA OF SIMILAR SOLIDS**

  - ○ **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

15. VOLUME

- **RELATING TWO-DIMENSIONAL FIGURES TO THREE-DIMENSIONAL SOLIDS**

  - ○ **KY.HS.G.28** *Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-dimensional objects generated by rotations of two-dimensional objects.*

- **VOLUME OF PRISMS AND PYRAMIDS**

  - ○ **KY.HS.G.26** *Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.*
  - ○ **KY.HS.G.25.b** *Finding the volume of a sphere, prism, cylinder, pyramid and cone.*
  - ○ **KY.HS.G.27** *Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms.*
  - ○ **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

- **VOLUME OF CYLINDERS AND CONES**

  - ○ **KY.HS.G.26** *Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.*
  - ○ **KY.HS.G.25.b** *Finding the volume of a sphere, prism, cylinder, pyramid and cone.*
  - ○ **KY.HS.G.27** *Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms.*
  - ○ **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*

16. APPLICATIONS OF VOLUME

- **MODELING SITUATIONS WITH GEOMETRY**

  - ○ **KY.HS.G.31** *Apply geometric methods to solve design problems.*
  - ○ **KY.HS.G.30** *Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.*

- **VOLUME OF COMPOSITE SOLIDS**

  - ○ **KY.HS.G.29** *Use geometric shapes, their measures and their properties to describe objects in real world settings.*
  - ○ **KY.HS.G.26** *Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.*